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Do sustainability measures constrain urban design creativity?

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Planners, architects, urban designers and other built environment professionals engage with a myriad of checkboxes, guidelines, requirements and specifications, all of which potentially compromise creativity and innovation in urban design. Approaches that measure performance are accused of belying the nature of places as messy, plural, organic, accidental and emotive; trying to find a formula that works may tick boxes, but it risks creating soulless spaces, oppressing innovation and incorporation of inappropriate design elements. This paper argues that sustainability assessment methods do have something to contribute to creativity and innovation in urban design precisely because they encourage engagement with challenging and often complex societal priorities. Through interviews with built environment professionals and a critical examination of sustainability assessment methods, the authors suggest that such methods can promote creativity and innovation if they engage competently with sustainability, work at a scale that allows for both breadth and depth (typically greater than the building scale) and incorporate in their design a set of eight key characteristics designed to promote creativity and innovation.

1. Introduction

In 2005, Urban Task Force, the UK body charged with setting out a vision for the renaissance of cities, stated that, ‘the majority of new developments remain poorly designed, with public realm and buildings of a very low quality’ and that ‘too many housing projects ... often lack the core social and commercial institutions that sustain urban life and any sense of place or beauty’ (Urban Task Force, 2005, p. 5). They believed that design quality was not considered a priority by the public sector, nor was design culture properly embedded in procurement and management processes. Since this time, government and local authorities have attempted to bring design quality to the foreground within urban design, planning and sustainability (e.g. ODPM, 2005). What has often happened, however, is that the arising guidelines and assessment methods, which aim to improve design quality, rigidly and restrictively quantify or objectify urban design into a series of tick boxes, indicators and normative requirements for the sake of efficiency, thus negatively impacting the quality of urban design by constraining creativity and innovation (Kelbaugh, 2002).

Rather than view guidelines, assessment methods and their ilk as hindering creativity and innovation in urban design, this paper

suggests that, if properly embraced, such approaches actually may promote these attributes by facilitating opportunities to engage directly with complex issues, such as sustainability, resilience and liveability. Furthermore, there are opportunities for guidelines, assessment methods and specifications to *enhance* creativity and innovation by incorporating characteristics that promote these attributes. In this paper the authors investigate the following research questions: Do sustainability assessment methods encourage or hinder creativity and innovation in urban design? How can they encourage creativity and innovation?

The methodology used in conducting the research is first outlined in the following section. In Section 3, the authors summarise urban design – it is here that the tension between fostering creativity and innovation, and the requirement to follow established procedures, is first highlighted. The fourth section introduces sustainability assessment methods and establishes their relationship with urban design. In Sections 5 and 6, eight key characteristics that promote creativity and innovation are derived, and their presence or absence in a selection of 32 sustainability assessment methods is assessed. Section 7 then draws together and summarises the above content, and the paper concludes with the formulation of a

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principle for promoting and enhancing creativity and innovation in sustainability assessment methods.

2. Methodology

The authors conducted eight interviews with nine UK built environment professionals (two were interviewed together): two architects, two design and engineering consultants, four sustainable development consultants and one urban designer. Two of the nine interviewees have multiple professional roles, although for the purpose of this paper the interviewees' primary current roles were used. This group was selected because urban design is informed by a breadth of professions, rather than solely by urban designers (Lombardi *et al.*, 2011). Interviews were typically an hour in duration and (with two exceptions) both lead authors were present. Semi-structured interviews were employed, comprising seven questions plus supplementary questions when necessary (e.g. to clarify issues), as listed below.

- (a) What does urban design mean to you?
- (b) What promotes innovation and creativity in urban design?
- (c) What techniques or methods do you use to encourage innovative and creative urban design, both yourself and in others?
- (d) Do you think the trend towards designing sustainable places offers designers an opportunity for creativity and innovation?
- (e) What is your experience of sustainability assessment methods?
- (f) Do sustainability assessment methods promote or hinder creativity and innovation in urban design? Specifically which ones... good and bad... and why?
- (g) Are there any urban design assessment methods in addition to those mentioned in this interview that you wish us to note?

Immediately following each interview a summary was compiled and validated by the interviewee. The summaries were analysed for information related to the study's two primary constructs: (a) characteristics of creativity and innovation, and (b) engagement with complex issues (i.e. sustainability). A content analysis of the summaries was conducted to identify additional themes.

In this way, the built environment professionals determined which sustainability assessment methods were to be examined, as well as which relevant characteristics to investigate. It should be noted that the interviewees were not asked to define concepts, such as 'good', 'quality' or 'sustainability' during interviews; rather, they focused on barriers to creativity and innovation in relation to addressing dimensions of sustainability to achieve their own notions of 'good' and 'quality'.

3. Defining urban design

From its beginnings in the 1950s as a confluence of architecture, landscape architecture and town planning (Frey, 1999; Krieger, 2008; Mumford and Sarkis, 2008; Schurch, 1999), urban design has grown and matured into something more than just designing places that look good (see Cuthbert (2010) for a discussion about who established urban design and when it was established, and Frey (1999) for a discussion of how urban design should not be a discipline in its own right). Dimensions of urban design include relationships between people and between people and places (DETR and CABE, 2000; Mumford and Sarkis, 2008); the spirit of place (Norberg-Schulz, 1979); satisfying practical and emotional needs (Mumford and Sarkis, 2008); ordering the future, but not necessarily creating utopian futures (Kreditor, 1990); the dynamic features of space and time (DETR and CABE, 2000; Lynch, 1981; Mumford and Sarkis, 2008); how the physical parts of the built environment create networks of spaces and activities, which, in turn, have social roles (CABE and DETR, 2001); creating places that all citizens enjoy and with which they identify (Buchanan, 1988; Lai, 1988); the integration of humans and nature (Colman, 1988; Ellin, 2013); and the response to urban change and development (Barnett, 1982; Rowley, 1994). These dimensions help in understanding what comprises urban design: it is 'the art and process of designing, creating, making and managing spaces and places for people' (Boyko *et al.*, 2005; cf. Cuthbert (2011) and Marshall (2009) for a discussion about the lack of a broadly accepted definition).

Two themes emerge from these ideas and from within the urban design literature, both of which were supported by the interviews. First, that urban design is an *art* (Biddulph, 2012; CABE and DETR, 2001; Cowan, 2000; Floyd, 1978; Lynch, 1981; Moughtin *et al.*, 2003; Norberg-Schulz, 1979). The 'design' part of urban design suggests a link with the arts and humanities (Biddulph, 2012), especially the notions of creativity and innovation (see Section 5 for definitions of these terms), which stem from synthesis and imagination. All nine interviewees acknowledged that urban designers must creatively apply their skill, ability, knowledge, craft, science and imagination, and may involve innovation and taking risks: 'Creativity seeps through the cracks, innovation breaks through' (design and engineering consultant 1, 5 September 2013). All the interviewees also acknowledged the limitations that working in urban design can place upon designers. For example, one interviewee suggested that compliance is perceived to be more important in the current linear UK planning system, allowing for innovation neither to seep nor break through (design and engineering consultant 2, 17 September 2013).

The second theme is that urban design is a *process* (Barnett, 1982; CABE and DETR, 2001; DETR and CABE, 2000; Frey, 1999; Gosling, 1984; Madanipour, 1997; Toon, 1988; Webber, 1988; see also Brown, 1971, 1990). Process is the framework,

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rules and guidelines that allow for the 'orchestration of the city's physical parts' (Frey, 1999, p. 16). Outlining a process for urban design, whether it is for policy or practice, means that the generic 'rules' will be known by decision makers and stakeholders. All the interviewees recognised the value of following an urban design process to ensure more desirable outcomes. Doing so could result in a more open and transparent way for understanding how decisions are made, for allowing creativity to be part of the process and for acknowledging the political context under which decisions are made (Biddulph, 2012). The challenge is to undertake a process that does not stifle creativity and innovation.

4. Urban design and sustainability assessment methods

Recent decades have seen growing influence of the principles of sustainable development upon urban designers, urban design, the built environment and users of the built environment. The Brundtland Commission (WCED, 1987), the 1992 Earth Summit in Rio and the establishment of Agenda 21 and in 1996 of UK Local Agenda 21 placed urban sustainability as a high priority for all levels of UK government as well as for the private and academic sectors. Good urban design became an integral part of building and maintaining sustainable communities, ensuring that the government's social, environmental and economic objectives were intimately tied with how places were designed and developed (ODPM, 2003, 2005). All but one of the interviewees reflected this thinking. However, when asked whether or not 'doing' sustainability, *de facto*, leads to good urban design, the interviewees were split: half said that urban designers would have engaged with sustainability if not pushed by external factors, such as legislation. The other half felt that the emphasis on adhering to sustainability standards seems to have allowed urban designers to address previously unconsidered issues.

Sustainability assessment methods, such as Breeam and Code for Sustainable Homes, are used to improve the sustainability of designed buildings and spaces up to and sometimes beyond legislative requirements (Barlow, 2011; DCLG, 2014). Although the interviewees acknowledged this, they believed it was difficult for urban designers to know what methods are available to them at what stages of the urban design process. In addition, questions arose about whether these methods stifled creativity and innovation due to their tick-box approach and normative aspects. Eight of the nine interviewees agreed with this statement: these methods contribute primarily to the technical aspects of sustainability, not to creativity. However, they also recognised that these methods provide a way for urban designers to engage with sustainability, a complex and fast-moving issue, providing information that could form the basis for creativity and innovation.

While scholars have identified more than 700 different sustainability assessment methods (see Deakin *et al.*, 2002; Gil and Duarte, 2013; McCreadie, 2006; Poveda and Lipsett, 2011), over half the interviewees failed to directly reference specific methods until prompted by the interviewers (with an average of four methods mentioned per interviewee). Methods were often discussed as a seemingly homogeneous group. In all the interviews, aspects of assessment methods that were not attributed to specific methods were offered. These fell into two areas: method design and function, and method operation.

4.1 Method design and function

Positive comments focused on the ability of sustainability assessment methods to prompt thinking on issues that might not otherwise have been considered (e.g. elucidating and prioritising aspects of urban design that influence sustainability, breaking down silos). One interviewee expressed a desire for methods that assess the value and quality of design, not just their impact on sustainability (sustainable development consultant 4, 10 September 2013).

Although interviewees were split as to whether methods should consider sustainability holistically, a sub-section of those who favoured the holistic approach wanted greater emphasis on social equity and social justice. This finding speaks to their perception that urban design can be used to exclude sectors of society, restricting access to scarce resources and reinforcing outdated social norms. The interviewees' comments also suggest that the current suite of available methods could be used as part of a larger, creative process for including a greater number and diversity of voices in urban design.

Interviewees' negative comments highlighted that methods can be too detailed and scientific. In some cases, then, the methods become overly prescriptive and assume a solution without the opportunity for built environment professionals and other stakeholders to engage with the bigger 'urban design' picture, thus hindering creativity and innovation.

4.2 Method operation

Comments focused on the possibility of making the evidence-gathering process less onerous and more transparent, the need for transparency throughout decision making, the importance of allowing time for designs to evolve and the benefits of greater time spent on co-production and co-design (stakeholder input was seen as desirable even if it did not necessarily lead to a better outcome). The latter comment raises the possibility of bringing creativity and innovation into urban design through interesting, fun and ongoing collaboration with a variety of people.

In addition, three interviewees thought that assessment methods should fit naturally within existing urban design

stages, phases and activities (even though the literature reflects that these are not standardised; see Boyko *et al.* (2005)).

5. Characteristics that promote creativity and innovation

Sawyer (2012) refers to creativity as comprising a little 'c' and a big 'C'. The little 'c', or individualist approach to creativity, concerns 'a new mental combination that is expressed in the world' (p. 7). The big 'C', or sociocultural approach to creativity, is about 'the generation of a product that is judged to be novel and also to be appropriate, useful, or valuable by a suitably knowledgeable social group' (p. 8). Thus, creativity is not only about generating something unique; it also has to possess utility for people. Furthermore, an understanding of how to make something useful to people is important, which refers directly to innovation: it is a multi-stage process whereby ideas are transformed into new or improved products, services or processes so that the ideas advance, compete or differentiate themselves successfully (Baregheh *et al.*, 2009).

To promote creativity and innovation in urban design a number of characteristics need to exist. These characteristics are not specific to urban design, but may be found in, and adopted from, other professions and disciplines, such as design, design management and business (see Cooper and Press, 1995; Cooper *et al.*, 2011; Perks *et al.*, 2005). According to Amabile *et al.* (1996), and Bruno-Faria and Alencar (1997), creativity and innovation may be encouraged by the following.

- (a) Organisations that promote creativity. They may do this by
 - (i) fostering risk-taking and idea generation from the lowest to the highest levels of that organisation
 - (ii) promoting fair and supportive evaluations (i.e. are not critical)
 - (iii) rewarding and recognising creativity
 - (iv) allowing for collaborative idea flow across organisational levels and using participative management and decision-making practices.
- (b) Supervisors, project managers and leaders that promote creativity. They may do this by
 - (i) clarifying goals
 - (ii) interacting openly with people in the lower levels of an organisation
 - (iii) supporting a team's work and ideas.
- (c) Work groups that promote creativity. They may do this by
 - (i) having a diversity in team members' backgrounds
 - (ii) supporting mutual openness to ideas
 - (iii) fostering constructive challenging of ideas
 - (iv) possessing a shared commitment to a project.

- (d) Freedom in day-to-day conduct of work and a sense of ownership and control over work and ideas.
- (e) Resources to accomplish work (e.g. funds, materials, facilities).
- (f) Pressures that promote challenges (e.g. time pressures that foster working hard on challenging tasks and important projects).

The interviewees echoed many of the above characteristics – particularly around appropriate skills, a clear starting point, visionary leaders and a good team – and added some new ones, as follows.

- (g) Understanding the uniqueness of each design context, including constraints.
- (h) Knowing that inspiration may come from elsewhere (e.g. a development in another country).
- (i) Community involvement.
- (j) A committed and enthusiastic client (e.g. a local authority).

Summarising the above characteristics and thinking more broadly about designing and developing urban environments, eight key characteristics that promote creativity and innovation in urban design emerge, as listed below

- risk-taking in idea generation (from (a), (f) and (g))
- visionary leadership (from (b))
- team understanding and commitment (from (b), (c) and (j))
- clear, and ideally visionary, brief and strategy (from (b))
- access to relevant information and appropriate and sufficient resources (from (e) and (h))
- ownership of ideas (from (d))
- good communication skills, including visualisation and diplomatic skills (from (a), (b) and (c))
- working well with stakeholders outside the design team (from (i) and (j)).

6. Presence of creativity and innovation characteristics in sustainability assessment methods

No attempt was made during the interviews to define or reach a common understanding of what constituted a sustainability assessment method so as not to influence the interviewees' decisions about which methods they wished to discuss. With that in mind, interviewees identified 32 sustainability assessment methods. The most frequently cited methods were Breeam and Breeam Communities, each mentioned by five interviewees. Design Review Panel was the next most frequently mentioned assessment method, by three interviewees. Casbee, Ceequal, Green Star, Leed, Leed Neighbourhood Development, Passivhaus and SKA Rating were each mentioned by two interviewees, with all

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other assessment methods being mentioned by only one interviewee.

Of the ten assessment methods mentioned more than once, half were not discussed in detail: Casbee, Ceequal, Green Star, Passivhaus and SKA Rating. Of the remaining five, only Design Review Panel and Leed Neighbourhood Development were put forward as *supporting* creativity and innovation in urban design (see Table 1).

Table 2 shows which of the eight characteristics of creativity and innovation identified in Section 5 are incorporated within the sustainability assessment methods identified by the interviewees. Some interesting points to note can be drawn from this. Of the four methods that display all eight characteristics – Design Review Panel, Future Communities, Planning for Real, Urban/Building Futures Game – all operate at a scale above the building level. Aside from the Design Review Panel, Leed Neighbourhood was the only other method promoted by more than one interviewee as having a positive effect upon creativity and innovation. It incorporates three of the characteristics. The most commonly mentioned sustainability assessment methods – Breeam and Breeam Communities – contain one and four characteristics, respectively. The interviewees who mentioned Breeam Communities thought it somewhat hindered creativity and innovation with regard to its prescriptive elements, but it was its lack of robustness at assessing sustainability that prompted the majority of the criticism.

7. Discussion

It was apparent from the interviews that an instinctive reaction to rules and regulations – in this case, sustainability assessment methods – is that they stifle creativity and innovation. Interviewees felt that this can be the case particularly if those using or applying them do not properly embrace them and instead resort to ticking boxes and checklists. The danger with rules, regulations and directives is that the designer establishes what is needed to conform, works out the most effective way to achieve this (e.g. practically, with regard to cost) and then proceeds with implementation without properly reflecting on the process of urban design and looking behind or beyond the immediate requirements and normative elements. The interviewees also acknowledged the converse of this argument: rules, regulations, targets or other directives promote deeper thinking on complex issues and that the process of designing can be enhanced by such methods.

Half of the interviewees picked up on the tensions between the ability of assessment methods to engender thinking about complicated issues – providing guiding principles, providing information, possibly providing benchmarks and ideas of what success looks like – with being too prescriptive and driving out creativity and innovation. Interestingly, none of the interviewees

suggested sustainability assessment methods should be scrapped, although this may have been because of their perceived value in promoting the sustainability agenda rather than because of any positive impact they have on creativity and innovation in urban design.

There was broad recognition (by eight of the nine interviewees) of the role sustainability assessment methods have in elucidating sustainability issues, providing guidance and benchmarks, thus providing a platform from which urban designers can be creative and innovative. It was in the discussion of specific assessment methods that negative impacts on creativity and innovation prevailed, thus suggesting that those methods currently being applied in practice should be improved upon so they not only positively affect urban sustainability, but *also* creativity and innovation in urban design.

From the first interview, it became apparent that the use of sustainability assessment methods is inherently complicated and that their efficacy cannot be captured by simple uptake figures (if they existed, which they do not). Interviewees spoke about the difference between the use of an assessment method as it was designed to be used and its use in practice; in some cases the difference was marked. There also was a strong sense that methods are only as good as the person or team using them. This being the case, design teams and their organisations need the capability and capacity to engage with sustainability (and sustainability assessment methods) as well as to be creative and innovative.

The interviewees gave a sense that there was not much perceived difference between many of the sustainability assessment methods currently being applied in practice. Methods such as Breeam, Leed, Casbee and Green Star were discussed in some interviews as if they were almost identical. This may be because there genuinely is little difference between methods. Likewise, built environment professionals may not have a detailed understanding of the plethora of methods on the market and their general or specific use within sustainability, planning and urban design.

Much of what has been discerned from these practitioner views resonates strongly with the experience of the Designing Resilient Cities research team, of which the authors were a part. Designing Resilient Cities was a multi-disciplinary research programme that sought to provide an answer to whether design interventions in cities would likely be resilient in the far future (see Lombardi *et al.*, 2012; Rogers *et al.*, 2012). The Designing Resilient Cities tool (formerly known as the Urban Futures tool), a primary output from the research programme, was identified by one of those interviewed for this paper. The tool operates across scales (urban, neighbourhood and building) and contributes to five of the eight characteristics of creativity and innovation (see Table 2).

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Sustainability assessment method	Number of interviewees who mentioned the method	Aspects of the method that promote creativity and innovation, identified by interviewees	Aspects of the method that hinder creativity and innovation, identified by interviewees
Operational scale of method: National NPPF	1	■ Allows for flexibility	
Operational scale of method: Urban, neighbourhood and building Arup SPeAR	1	<ul style="list-style-type: none"> ■ Holistically considers sustainability ■ Considers interrelationships ■ Identifies strengths and weaknesses ■ Assesses impacts of change ■ Makes users think ■ Covers change over time ■ Does not provide an award 	<ul style="list-style-type: none"> ■ Not publically available
Bequest	1		<ul style="list-style-type: none"> ■ No value framework ■ Technocratic
Casbee	2		
Ceequal	2		
Design Review Panel	3	<ul style="list-style-type: none"> ■ Engages with outside experts ■ Understanding of criteria against which design will be tested ■ Pressure tests design ■ Addresses design quality ■ Stands up to scrutiny 	
GSAS: Global Sustainability Assessment System	1		
Parametric design	1	<ul style="list-style-type: none"> ■ Removes burden of time-consuming design elements ■ Provides performance data 	
Urban/Building Futures Game	1	<ul style="list-style-type: none"> ■ In its original form as the 'Urban futures game', the outcome was not prescribed 	<ul style="list-style-type: none"> ■ In its current form as the 'Building futures game', the outcome is prescribed as built form ■ Requires intellectual capacity for users to engage with it
Designing Resilient Cities tool (formerly known as the Urban Futures tool)	1		
Whole-life costing	1		
Operational scale of method: Neighbourhood and building Building for Life	1		
Enplanner	1	<ul style="list-style-type: none"> ■ Provides some data ■ Determines compliance with local planning 	

Table 1. Sustainability assessment methods identified by the interviewees
(continued on next page)

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Sustainability assessment method	Number of interviewees who mentioned the method	Aspects of the method that promote creativity and innovation, identified by interviewees	Aspects of the method that hinder creativity and innovation, identified by interviewees
Sustainability checklist	1	<ul style="list-style-type: none"> ■ Addresses compliance ■ Provides clues to what compliance looks like 	<ul style="list-style-type: none"> ■ Misused as a rote checklist
Operational scale of method: Neighbourhood Breeam communities (2012 revision)	5	<ul style="list-style-type: none"> ■ Can work at the urban design scale ■ Prompts thinking 	<ul style="list-style-type: none"> ■ Does not holistically consider sustainability ■ Lacks breadth ■ Lacks robustness ■ Self-referential ■ No quality assessment ■ Too specific and prescriptive in places ■ Too tedious
European common indicators of local environmental sustainability	1		
Future communities	1		
Leed neighbourhood development	2	<ul style="list-style-type: none"> ■ Prompts thinking 	<ul style="list-style-type: none"> ■ Does not holistically consider sustainability ■ Lacks breadth ■ Lacks robustness ■ Cannot work when starting from a blank sheet
Planning for real	1	<ul style="list-style-type: none"> ■ Encourages community involvement 	
Operational scale of method: Building Breeam	5	<ul style="list-style-type: none"> ■ Increases cross-disciplinary working ■ Can shape developments if used early in the design process ■ Addresses compliance ■ Provides clues to what compliance looks like ■ Common ■ Marketable ■ Provides benchmarks ■ Popular, recognised and valued in the UK 	<ul style="list-style-type: none"> ■ Misuse can lead to perverse outcomes ■ Justifies poor designs ■ Does not holistically consider sustainability ■ Lacks breadth ■ Lacks robustness ■ No value framework ■ Technocratic ■ Divorced from the development process ■ Used too late in the design process ■ Credit system is too rigid ■ Credit system is too onerous
Breeam new construction	1		
Building information modelling (BIM)	1		
Code for sustainable homes	1		
Defence related environmental assessment method (Dream)	1		
Design quality indicator (DQI)	1		

Table 1. Continued

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Sustainability assessment method	Number of interviewees who mentioned the method	Aspects of the method that promote creativity and innovation, identified by interviewees	Aspects of the method that hinder creativity and innovation, identified by interviewees
Green Star	2	■ Popular, recognised and valued in the UK	■ Not fit for the UK market
Leed	2		■ Does not holistically consider sustainability
Leed building design	1	■ Common	
		■ Marketable	
		■ Provides benchmarks	
Leed construction	1	■ Common	
		■ Marketable	
		■ Provides benchmarks	
Passivhaus	2		
Sefaira	1	■ Provides performance data	
SKA Rating	2		

Table 1. Continued

When trialling the tool with a wide range of different practitioner groups (e.g. architects, town planners, engineers), it became apparent that one of its most important features is forcing designers to question their design thinking. Moreover it does not attempt to impose anything, dictate or limit design solutions, or remove responsibility from the designer. In these ways, the tool does not stifle creativity or innovation; rather, it encourages thinking about alternative approaches by raising ‘what if?’ questions. These ideas were supported by the interviewees, who largely agreed that currently adopted sustainability assessment methods should raise open-ended questions alongside providing guidelines, performance parameters and benchmarks. It is argued that it is for this reason that the Design Review Panel was most positively viewed by the interviewees.

8. Conclusion

The insights from nine interviews with UK built environment professionals on the relationship between sustainability assessment methods and creativity and innovation in urban design are revealing, and confirm many of the core findings within urban sustainability research. Interviewees named 32 methods as well as characteristics that promote or hinder creativity and innovation in urban design. The methods were assessed for the presence of eight ‘key’ characteristics that promote creativity and innovation. From the analysis, it has been possible to establish that sustainability assessment methods do impact creativity and innovation in urban design, and that many current methods are described more negatively than positively in terms of their impact upon creativity and innovation.

There also was broad recognition of the value that sustainability assessment methods have in elucidating sustainability issues and in providing guidance on how they might be addressed. This, in turn, provides a platform from which urban designers can be creative and innovative, both at specific points in the urban design process and throughout the process. Based on the above findings, the authors propose the following principle: a sustainability assessment method will promote creativity and innovation in urban design if it engages competently with sustainability, works at a scale that allows for breadth and depth (typically greater than the building scale), and incorporates a set of eight key characteristics designed to promote creativity and innovation. This principle should guide any new sustainability assessment methods under development.

The findings also suggest that the people creating sustainability assessment methods should think more broadly about those who will use their methods and for what purpose(s). At the moment, many methods appear to be designed to work within a more deterministic, normative, empirical and scientific framework. They either fail to understand or ignore the

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Creativity and innovation characteristics incorporated within the method:									
Assessment method	No. of interviewees mentioning method	A	B	C	D	E	F	G	H
Eight characteristics									
Design review panel	3	✓	✓	✓	✓	✓	✓	✓	✓
Future communities	1	✓	✓	✓	✓	✓	✓	✓	✓
Planning for real	1	✓	✓	✓	✓	✓	✓	✓	✓
Urban/Building futures game	1	✓	✓	✓	✓	✓	✓	✓	✓
Seven characteristics									
None									
Six characteristics									
Ceequal	2			✓	✓	✓	✓	✓	✓
Design quality indicator (DQI)	1			✓	✓	✓	✓	✓	✓
Five characteristics									
Arup SPeAR	1			✓	✓	✓	✓	✓	
Designing resilient cities tool	1	✓			✓	✓	✓	✓	
Four characteristics									
Breem communities	5			✓	✓	✓			✓
Building for life	1			✓	✓	✓			✓
Three characteristics									
Lead neighbourhood development	2			✓	✓	✓			
Sustainability checklist	1			✓	✓	✓			
Two characteristics									
Building information modelling (BIM)	1					✓		✓	
GSAS	1					✓			
NPPF	1	✓							✓
Parametric design	1					✓		✓	
Sefaira	1					✓		✓	
SKA rating	2					✓		✓	
One characteristic									
Bequest	1					✓			
Breem	5					✓			
Breem new construction	1					✓			
Casbee	2					✓			
Code for sustainable homes	1					✓			

Table 2. Creativity and innovation characteristics incorporated within the sustainability assessment methods identified by the interviewees (continued on next page)

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Creativity and innovation characteristics incorporated within the method:									
Assessment method	No. of interviewees mentioning method								
		A	B	C	D	E	F	G	H
Defence related environmental assessment method (Dream)	1					✓			
Enplaner	1					✓			
European common indicators	1						✓		
Green Star	2					✓			
Leed	2					✓			
Leed building design	1					✓			
Leed construction	1					✓			
Passivhaus	2					✓			
Whole-life costing	1					✓			

Note: A = Risk-taking in idea generation; B = Visionary leadership; C = Team understanding and commitment; D = Clear, and ideally visionary, brief and strategy; E = Access to sufficient relevant information and appropriate and sufficient resources; F = Ownership of ideas; G = Good communication skills, including visualisation and diplomatic skills; H = Working well with stakeholders outside the design team.

Table 2. Continued

creative and innovative aspects of urban design and the designers who use them (and who work in a more 'designerly' way) (Cross, 1982). Perhaps, when sustainability is more embedded in society, sustainability assessment will naturally encourage creative processes as well as creative and sustainable design solutions.

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